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III. RELATING TO THE GRAPH OF $Y = f(X)$ FOR COMPLEX VARIABLES.

By E. L. REES, University of Kentucky.

The following is to suggest a slight modification of the geometric representation of $Y = f(X)$, (X and Y both complex) given by Professor Frumveller in the November, 1917, number of the MONTHLY.

Let $X = x + iy$ and $Y = u + iv$. Letting u be represented by perpendiculars to the plane of X we get a surface which pictures the variation of the real part of Y . On this surface draw the contours for $v = v_1, v_2$, etc., the consecutive v 's differing by a constant. These contours enable us to visualize the variation of v , so that we have pictured the variation of both u and v and, therefore, of Y , all on one surface.

Let the surface be cut by planes parallel to the X -plane, the planes of all of the consecutive pairs being the same distance apart. Project these curves of intersection and the contours on the X -plane. The curves into which these curves project will be the images of the grating of lines parallel to the u and v axes in the Y -plane. We thus establish a simple relation between this scheme and the usual scheme of representation of functional correspondence in complex variable theory.

For the linear function the surface is a plane and the contours are lines in this plane perpendicular to its xy -trace. If the coefficients are real the plane is parallel to the y -axis.

For the quadratic function the surface is a hyperbolic paraboloid and the contours are the intersections of this surface and hyperbolic cylinders.

For $Y = \log X$ the locus is a funnel-shaped surface generated by revolving $u = \log x$ about the u -axis and the contours are the meridians of this surface.

The projections of these contours and the intersections of the surfaces by the parallel planes on the X -plane give the familiar curves associated with these functions.

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